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ABSTRACT

A short, preliminary discussion of simulation and gaming outlines the various instructional and research techniques which come under the more general heading and lists the properties of each. Six sections of annotated, bibliographic entries serve as a guide to the literature on simulation and gaming. Documents are grouped under the following categories: (1) general discussions of simulation and gaming, (2) media-ascendant simulation (learning through vicarious experience mediated by machines, films, pictures, etc.), (3) inter-personal ascendant simulation (characterized by decision-making, role playing, and player interaction), (4) games that do not involve simulation, (5) the use of simulation to assess performance (situational response testing), and (6) bibliographies. Centers where work is being done on simulation techniques, as well as the names of professional organizations concerned with these techniques are listed. Finally, the titles of journals and newsletters which carry current information on the field are provided. (MT)

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A BASIC REFERENCE SHELF ON SIMULATION AND GAMING

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Higher Education

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A BASIC REFERENCE SHELF ON SIMULATION AND GAMING

The innovation called "simulation and gaming" may be traced to at least three ancestors: simulator trainers, games, and role-playing. The ancestral list may be longer, but for present purposes these three will suffice.

Simulation has been defined in the most general terms as the obtaining of the essence of something, but without all aspects of reality.[1] Simulator trainers illustrate this definition admirably. A pilot trainee may learn to fly an airplane by use of a simulator that even provides the appropriate visual stimulus of a runway that informs him whether he is too low or too high, or off-center. If a real plane were used, practice landings would be most hazardous for the novice and distasteful to his copilot and navigator, and there also would be the expense of taking the craft off the ground. The computer-controlled simulator provides the essence of flying without the hazard. The attempt here is to allow the trainee to experience vicariously what he eventually has to experience in the real world. Some aspects of reality are omitted, while other aspects are represented.

Games may be thought of as competitive encounters between individuals that involve some degree of skill and/or luck. Games have been a part of most cultures and are usually looked upon as a quite pleasant (or even stimulating) diversion. One cannot deny that leaving a game of chess uncompleted to perform more mundane tasks may be quite jarring (at least for the avid player). Excellent theoretical discussions of games are available elsewhere for the serious student.[2]

Role-playing is taken by some to mean the depiction of characters in scenes for illustrative purposes. For example, an instructor may stage a proper interview approach in a course of training for a team of research workers. For others role-playing means the same thing as sociodrama, which originally referred to a therapeutic technique involving groups, in contrast to psychodrama, which is a therapeutic technique for individuals. Still others equate role-playing with "let's pretend" or "play-acting." Grambs[3] defines role-playing as "unprepared, unrehearsed, dramatization." In any event, the various definitions of role-playing center on the development of deeper understanding of social relations. The practice of experiencing the actions and feelings of someone else is typified in most simulation games. For example, when a learner behaves as though he were a senator in a legislative assembly, clearly, he is "being someone else."

From these three rather different heritages–the simulator for training, the game for entertainment, and role-playing for understanding one's self and others–have evolved the educational innovations that now are grouped under the heading "simulation and gaming." No attempt will be made here to justify which innovations belong in the list, and which do not. For the most part, making sense out of the field of simulation and gaming in an attempt to justify any grouping of techniques seems rather unsatisfying. [See P. J. Tansey and Derick Unwin (1969) and P. A. Twelker (1969) in Section A of this report.] The tack to be taken here is to arbitrarily single out three types of techniques that are usually considered as representative of simulation and gaming and relate these to the three ancestral roots identified above. The three techniques are:

Media Ascendant Simulation–techniques that emphasize learning through vicarious experience usually mediated by machines, films, pictures, etc.

Inter-personal Ascendant Simulation–techniques that are characterized by decision-making, role playing, and player interaction.

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1 Thomas, Clayton J., and W. L. Deemer Jr., "The Role of Operational Gaming in Operations Research," *Operations Research, 5,* (1), 1957, 1-27.

2 Von Neumann, John and Oskar Morgenstern, *Theory of Games and Economic Behavior* (Princeton, New Jersey: Princeton University Press) 1944.

3 Grambs, J. D. and others, "Discussion and role-playing," In *Modern Methods in Secondary Education* (Rev. Ed.) (New York: Dryden Press) 1958, p. 252-315.

Non-Simulation Games–techniques that feature a competitive context for learning concepts and principles drawn from formal disciplines (sometimes referred to as motivational games).

Although these categories are not foolproof, they do serve as a "benchmark" for exploration. Perhaps a few examples under each category would be helpful:

Media Ascendant Simulation

Classroom Simulation (Teaching Research)
Teaching Problems Laboratory (at least those parts not involving role-playing) (SRA)
Simulator Trainers
Simulation of Dental Emergencies (Teaching Research)
"One-man" Computer Games, e.g., Sierra Leone

Inter-personal Ascendant Simulation

Most Social Studies Simulation Games, e.g., Manchester, Consumer, Life Career, Triangle Trade, Inter-Nation Simulation, and Monopoly
Most Management Games
Planning Exercises

Non-Simulation Games

WFF'N PROOF
Equations
Propaganda
Get-Set Games for Beginning Readers

The table below summarizes the ancestry for each category:

Technique

Ancestor	Media Ascendant Simulation	Inter-Personal Ascendant Simulation	Non-Simulation Game
Simulation	Yes	Yes	No
Gaming	Depends on Technique	Yes	Yes
Role-Playing	Depends on Technique	Yes	No

The Use of Simulation for Measurement

A most interesting use of simulation is in the assessment and evaluation of performance. The assessment of performance may be carried out with simulation in all sorts of activities, and offers a unique opportunity to assess performance in a life-like setting that often cannot be tested by other means. It is held by many that the more closely the test situation approximates the real-life situation, the more powerful the prediction.

Examples of situational responses tests include:

Patient Management Simulation (American Board of Orthopedic Surgery)
Inbasket Tests
Russell Sage Social Relations Test
Motion Picture Tests, e.g., Classroom Simulation Test (Teaching Research)

References to this use of simulation may be found below under "Situational Response Testing."

A Mini-Report on the State of the Field

Media Ascendant Simulation–If one were to judge the state of the art in terms of military applications, one would have to conclude that the technique has come of age. The Arthur D. Little, Inc., Report[4] states that:

> The growing emphasis on cost/effectiveness in military training programs will result in much greater use of simulation training. NTDC personnel suggest that the use of simulation is in its infancy and that there may be almost total dependency on simulation in several training areas in the not-too-distant future. Typical areas which lend themselves to simulation techniques are cockpit and operational flight training, in-flight training, and training in electronic warfare and weapon systems.
>
> In order to teach personnel to operate in the conceptual, psychophysical environments of the present and those anticipated for the future, new technologies are used to stimulate such environments visually. A simulator involves any one of a combination of the training environment, computing and associated simulation systems, and instructor station and display systems. Electronics and optics represent major elements in the fabrication of a simulator. However, the market is not limited to electronics and optics companies; industrial organizations having educational technology capabilities should realize a considerable share of this market.

The application of the simulator trainer concept to civilian education has not been so rapid. Few simulators have been used in occupational education. On the other hand, there has been quite a lot of effort in the area of teacher training. The factors that preclude rapid adoption of media ascendant simulation in public education seem to include expense, insufficient cost/effectiveness data, and slowness of acceptance by educators.

Inter-personal Ascendant Simulation–The basic idea behind the use of a simulation game as a teaching device seems to be widely accepted. *Education, USA*, proclaims simulation gaming as the innovation of the 1970's. Yet, the use of outside funding for conducting institutes for training teachers to *develop* games seems to have had little or no effect. (The writer is indebted to Dr. Jerry Fletcher for his insights in this area.) It has become apparent that developing operational simulation games that may be used in a wide variety of classroom settings by a wide variety of teachers is quite a laborious process. It is relatively simple to conceptualize a game, but it is rather difficult to move from a basic conceptualization to a game that is playable in a classroom and can be used by teachers other than the designer. Therefore, the training of teachers to use or adapt existing games seems to be appropriate. Teachers can be trained to use existing games in many ways and to adapt these games to specific objectives and to specific learner populations with a great deal of success. Unfortunately, research on learning from simulation games is in its infancy. Teachers and designers alike have very little to go on as they design, adapt, or even use simulation games.

Non-Simulation Games–For many teachers, the non-simulation game represents a good place to begin the study of the innovation of simulation and gaming. For the most part, objectives of learning–using non-simulation games–are easily identifiable. Revisions to a basic game are easily accomplished, even by students themselves. Non-simulation games seem to have enjoyed acceptance quite a few years before the innovation g ned in popularity. However, non imulation gaming shares with the simulation area the same paucity of meaningful research pertaining to variations in important dimensions of the game and the claimed learning outcomes.

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[4] Arthur D. Little, Inc., *The Government Instructional Market* (Cambridge: Arthur D. Little Inc.) May 1968, p. 13.

Guide to the Literature

This basic reference shelf on simulation and gaming is organized into ten general sections. Six of the ten sections serve as a guide to the literature:

A. General discussion of simulation and gaming
B. Media-ascendant simulation
C. Inter-personal ascendant simulation
D. Non-simulation games
E. Situational response testing
F. Bibliographies

The last four sections serve as a guide for those interested in exploring the innovation further:

G. Professional organizations
H. Centers of activity in simulation and gaming
I. Journals
J. Newsletters

A. General Discussion of Simulation and Gaming

The following documents are useful in that they review the field in general. In most of them, all forms of simulation and gaming are discussed.

Some Dimensions of Simulation. Isabel Beck and Bruce Monroe, Seal Beach, California: INSGROUP, Inc., Presented at 1969 American Educational Research Association Meeting, Los Angeles, California, 13pp., Available from the ERIC Document Reproduction Service as document ED 028 131, Microfiche 25c, Hardcopy 75c.

A useful introduction, this is a brief discussion of simulation and gaming as a methodology for instruction. Dimensions of simulated environments are discussed such as reality and fidelity, complexity of decisions, curriculum content, source of model, simulation and game replicability, and evaluation. Advantages and disadvantages of simulation are proposed. Included are a glossary of terms and a 28-item annotated bibliography.

Simulation in Preparing School Personnel. Donald R. Cruickshank and Frank W. Broadbent, Washington, D.C.: ERIC Clearinghouse on Teacher Education, November 1969. Availability will be announced in the June 1970 issue of *Research In Education.*

A state-of-the-art paper written mainly for teacher educators that presents discussions of the design, development, and uses of instructional simulations in professional education. Includes an exploration into issues to be resolved, questions requiring research, and advantages and disadvantages of simulation. A highly informative document, it is must reading for all who are concerned with instructional simulation and the preparation of school personnel.

Simulation in Social Science: Readings. Harold Steere Guetzkow (Ed.), Englewood Cliffs, New Jersey: Prentice-Hall, 1962, 199 pp., ($5.25).

This book describes simulation as a vehicle both for training and for research. The Inter-Nation Simulation is covered in considerable detail. A valuable source book for those interested in exploring man-computer approaches to the simulation of international-economic systems.

Simulation and Gaming in Education. P. J. Tansey and Derick Unwin, London: Methuen Educational Ltd., 1969. Available in hardbound ($5) and paperback ($2.50) editions from Barnes and Noble, Inc., 105 Fifth Ave., New York, N. Y. 10003.

This text represents the first United Kingdom commercial publication to summarize and explore in some depth all of the various educational techniques that are commonly thought of as instructional simulation or gaming. The book which is aimed primarily at the teacher and the teacher educator examines

(1) the historical development of simulation and gaming, (2) its advantages, (3) models and varieties of simulation (simulation games, non-simulation games, and non-game simulation exercises), (4) simulation in teacher education, and (5) computers and simulation. It is informative for the novice as it pulls many diverse elements into one place.

Some Aspects of Simulation in Education. P. J. Tansey (Ed.), Maidenhead, Berkshire, England: McGraw-Hill, in press, expected publication date, Spring 1970.

This reference book will cover a number of aspects of simulation and gaming as they relate to education. Chapters include:

"Some Examples of Programed Non-Simulation Games: WFF'N PROOF, On Sets and Equations." (Layman E. Allen)

"The Use of Simulation in the Study of International Behavior." (Robert C. Boardman and C. R. Mitchell)

"Teacher Education Looks at Simulation: A Review of Selected Uses and Research Results." (Donald R. Cruickshank)

"Simulation: A Catalog of Judgments, Findings and Hunches." (Dale M. Garvey)

"An Introduction to the Virtures of Gaming." (Fred Goodman)

"Simulation of International Relations." (Paul Smoker)

"A View of Simulation, Its Methods, Models, and Application in Educational Processes." (P. J. Tansey)

"Simulation and Media." (Paul A. Twelker)

"Simulation and Games: Descriptions and Sources." (Derick Unwin)

"The Role of Simulation and Games in the Development of Geography Teaching." (Rex Walford)

Instructional Simulation: A Research Development and Dissemination Activity. Paul A. Twelker (Ed.), Monmouth, Oregon: Teaching Research Div., Oregon State System of Higher Education, February 1969.

This report discloses the results of 18 months of exploration in the field of simulation. Among the chapters, "Simulation: An Overview," by Paul A. Twelker, furnishes the reader with a broad look at the field of simulation, provides a rationale and conceptual framework for subsequent discussions, and discusses many of the more important issues in the design and use of simulation. "The Design of Instructional Systems," by Jack Crawford and Paul A. Twelker, presents a 13-step model of simulation design used at Teaching Research. "Instructional Simulation: Past, Present, and Future," by Paul A. Twelker, examines the application of simulation in both school and non-school settings (e.g., the military, business, and government). In "Simulation in Vocational Education," by Dale G. Hamreus, the important contributions of the military to simulation for vocational training are discussed in the light of civilian occupational training. And finally, "Situational Response Testing: An Application of Simulation Principles to Measurement," by H. Del Schalock, gives attention to the use of simulation for measurement purposes. The appendices include listings of independent and dependent variables involved in learning game design, the four issues of the *Instructional Simulation Newsletter* published during the project, and some suggested new directions for games and simulation. The report is especially valuable because it pulls together relevant information to assist the reader in assessing the status of the field. Extensive reference lists are provided.

B. Media Ascendant Simulation

These four references give a good overview of this type of simulation. The documents by Cruickshank and Kersh are of special interest to the teacher educator.

The Simulation and Analysis of Problems of Beginning Teachers. Donald R. Cruickshank and Frank W. Broadbent, Brockport, New York: New York State University, September 1968, 246 pp. Available from the ERIC Document Reproduction Service as Document ED 024 637, Microfiche $1, Hardcopy $12.40.

Reports a study conducted to determine the effectiveness of simulation for the presentation of critical teaching problems and the effect on student teachers of exposure to a simulated critical teaching problems. A 523-item bibliography and materials used in the study are appended. Valuable to educators and others interested in designing media-based simulation systems.

"Simulators." Robert M. Gagné. In *Training Research and Education,* Robert Glaser (Ed.), New York: Science Editions, Wiley, 1965, pp. 223-246, ($2.65).

Different kinds of simulators and a variety of activities, processes, and objects that can be successfully simulated are discussed. A brief presentation of simulation and simulators and the practical application of simulation education in general is given. This chapter should be considered as basic reading for those interested in the use of simulation for training. A helpful reference list is also provided.

Classroom Simulation: A New Dimension in Teacher Education. Bert Y. Kersh, Monmouth, Oregon: Teaching Research Div., Oregon State System of Higher Education, June 1963, 108 pp. Available from the ERIC Document Reproduction Service as Document ED 003 613, Microfiche 50c, Hardcopy $5.50.

Of interest to educators and media personnel, this report describes the early work of Kersh in the area of fidelity of simulation. Size of the image and motion in the projected image were explored. Attention is devoted to describing the "classroom simulator" and the rationale for its development and use.

"Simulation and Media." Paul A. Twelker. In *Some Aspects of Simulation in Education,* P. J. Tansey (Ed.), Maidenhead, Berkshire, England: McGraw-Hill, in press, expected publication date, Spring 1970.

This useful document summarizes the military and civilian applications of simulation for instruction and testing which emphasize machines or media. Learning outcomes, both cognitive and affective, are discussed, as well as the advantages and limitations of media ascendant simulation. New directions that the innovation may be taking in the future are also discussed.

C. Inter-Personal Ascendant Simulation

"Education is Child's Play." Clark C. Abt. In *Inventing Education of the Future,* Werner Z. Hirsch (Ed.), San Francisco, California: Chandler Publishing Co., 1967, pp. 123-155, ($7.95).

This chapter concerns itself with several problems involved in teaching social studies in elementary and secondary classrooms, and builds a case for the use of games to alleviate these difficulties. An elementary theory of educational game design is presented that includes these steps: system analysis, design of a model, design of a human player simulation of the model, and refinement. Examples of educational games developed by Abt Associates are described. The advantages and limitations of educational games are discussed. The chapter is valuable in that it presents a precise case for using simulation games in the social studies classroom, as well as a thumb-nail sketch of the work at Abt Associates.

"Simulation Games and Learning Behavior (Part I)." James S. Coleman, Sarane Boocock, and E. O. Schild (Eds.). Special Issue of *American Behavioral Scientist, 10,* 2, October 1966.

The entire issue is devoted to simulation and gaming. A valuable compendium of articles on simulation gaming in the social sciences, it includes "Introduction: In Defense of Games' by James S. Coleman, "Some Current Research on Effectiveness of Educational Simulations: Implications for Alternative Strategies" by Cleo H. Cherryholmes, "An Experimental Study of the Learning Effects of Two Games with Simulated Environments" by Sarane Boocock, "The Differential Impact of a Game Simulating a Community Disaster" by Michael Inbar, and "Influences on Learning in Simulation Games" by James L. McKenney and William R. Dill.

"Simulation Games and Learning Behavior (Part II.) James S. Coleman, Sarane Boocock, and E. O. Schild (Eds.). Special issue of *American Behavioral Scientist, 10,* 3, November 1966.

This second of a two-part series includes "The Shaping of Strategies" by E. O. Schild, "Development of Strategy in a Simulation of Internal Revolutionary Conflict" by Holly J. Kinley, "The Game of Chicken" by Anatol Rapoport and Albert M. Chammah, "The Effects of Advisors on Business Game Teams" by William H. Starbuck and Ernest Kobrow, and "Two Computer-Based Economics Games for Sixth Graders" by Richard L. Wing. The appendices contain a listing of major centers involved in research and development on games and simulated environments and a selected bibliography on simulation games as learning devices. Together with Part I of the series, it represents a major source of information for the novice gamester.

"Simulation, Role-Playing, and Sociodrama in the Social Studies. With an Annotated Bibliography." Dale N. Garvey and Sancha K. Garvey, Emporia: Kansas State Teachers College. *Emporia State Research Studies, 16,* 2, 1967, pp. 1-21. Available from the ERIC Document Reproduction Service as Document ED 028 102, Microfiche 25c, Hardcopy $1.75.

A rationale is presented for the employment of simulation, role-playing, and sociodrama in the social studies classroom, and an interesting discussion places these techniques in perspective. The bibliography, containing materials and references on simulation and related subjects, has evaluative annotations which are useful to Teacher-educators as well as to trainees and teachers who are in the classroom.

Business Games Handbook. Robert G. Graham and Clifford F. Gray, New York: American Management Association, Inc., 1969, ($22).

This book is divided into three parts: 1) readings to introduce the concept of simulation gaming; 2) abstacts of general purpose, special purpose, and industry games currently being used; and 3) a bibliography which includes articles and books on business games. The game abstracts are especially useful as they include game descriptions, training purpose, decisions made by participants and game administrators, method of administration (manual or computer), and source of information. Written for company personnel managers, teachers, training directors, and management consultants, it is up-to-date and informative.

Business Simulation in Industrial and University Education. Paul S. Greenlaw, Lowell W. Herron, and Richard H. Rawdon, Englewood Cliffs, New Jersey: Prentice-Hall, 1962, 356 pp., ($10).

Provides helpful guidance and a comprehensive source of information on the design, administration and educational uses of business simulations, both in university curricula and in the management training programs of industry. A basic book in the field.

Developing Social Simulations (tentative title). Michael Inbar, Clarice Stoll and others, New York: Free Press, expected publication date, Spring 1970.

Written for a general audience as an introduction to various simulation techniques (teaching or research, computer or non-computer) and intended as an instructional manual, it includes eight "textbook chapters" written by Inbar and Stoll, and 14 chapters by contributors.

Simulation Games for the Social Studies Classroom. (New Dimensions Booklet on the Social Studies and World Affairs, Vol. 1, No. 1) William A. Nesbitt, New York: The Foreign Policy Association, 345 East 46th Street, 1968, 56 pp., ($1).

This easily read little booklet is aimed directly at the classroom teacher and presents precisely the "what" and "why" of simulation gaming. Included are useful descriptions of some representative classroom games and a discussion of the values and limitations of games. The bibliography lists resource persons and organizations, some games, books, articles, reports, and films on simulation.

Simulation and Society: An Exploration of Scientific Gaming. John R. Raser, Boston, Massachusetts: Allyn and Bacon, January 1969, 180 pp., ($2.95).

This is an attempt to write "the complete book on simulation." Part 1 begins by giving the reader a feel for simulation in general, and then delves into the simulation of social systems–a discussion that is somewhat technical in places. Part 2 looks at some specific functions that gaming and simulation perform in theory construction and in instruction. The book concludes with a section on the scientific validity of games. It is primarily aimed at the social scientist who may not be familiar with simulation. The educator will find some sections useful, particularly the chapter on games for teaching.

"Simulation: The Game Explosion." *Social Education, 33,* 2, February 1969, pp. 176-199.

This special section includes the following articles devoted to simulation: "Simulation in the Social Studies: An Overview" by Samuel Brodbelt, "Simulation Games in the Social Studies: The 'Reality' Issue" by Howard Kardatzke, "Simulations and Changes in Racial Attitudes" by Paul DeKock, "Organizing Simulated Environments" by Philip M. Burgess, and others, and "Simulation: The Games of 'Section' " by Angus M. Gunn. Also included is a Foreign Policy Association bibliography on simulation that includes a listing of resource persons, some simulation games, films, books, and reports. The articles and bibliography represent a wealth of information for the individual interested in social studies games.

"Social Simulations." Clarice S. Stoll and Michael Inbar (Eds.). Special issue of *American Behavioral Scientist, 12,* 6, July-August 1969.

The entire issue is devoted to simulation and gaming and includes the following articles: "Editorial Introduction" by Clarice S. Stoll and Michael Inbar, "Games as Vehicles for Social Theory" by James S. Coleman, "Social Research for Social Anticipation" by Paul Smoker, "Influences Detrimental to Simulation Gaming" by John D. Baldwin, "Simulation Models for Accounting Schemes" by Robert B. Smith, "The POLIS Laboratory" by Robert C. Noel, and "Computer Simulation of Innovation Diffusion in a Peasant Village" by Gerhard J. Hanneman and others. In addition, a one-page annotated bibliography (directed to the novice) is included, as well as a guide to recent publications in the social and behavioral sciences.

D. Non-Simulation Games

"Games and Programmed Instruction." Layman E. Allen. In *Communication Sciences and Law: Reflections from the Jurimetrics Conference,* Layman E. Allen and Mary E. Caldwell (Eds.), New York: Bobbs-Merrill Co., 1965, pp. 347-372, ($17.50). A portion of this paper was also published under the same title in *The Arithmetic Teacher, 12,* 3, March 1965 pp. 216-220.

The combination of games and programed materials in a way that is fun, so that learning will be stimulated and maintained, is discussed. Two games, WFF'N PROOF and EQUATIONS, are described. The reader is also referred to the following chapters in the Tansey book, *Some Aspects of Simulation in Education,* cited above: "Some Examples of Programed Non-Simulation Games: WFF'N PROOF, On Sets and Equations" by Layman E. Allen, and "An Introduction to the Virtues of Gaming" by Fred Goodman.

E. Situational Response Testing

"Proficiency Tests for Training Evaluation." Norman Frederiksen In *Training Research and Education,* Robert Glaser (Ed.), New York: Science Editions, Wiley, 1965, pp. 323-246, ($2.65).

The types of training evaluation measures available are discussed, including those that involve life-like behavior. Several examples of these tests are examined. A good place to start a study of the use of simulation in measurement.

"Simulation Technique in the Measurement of Problem-Solving Skills." Christine H. McGuire and David Babbott. *Journal of Educational Measurement, 4,* 1, Spring 1967, pp. 1-10.

Deals with the techniques, scoring, reliability estimation and validity assessment of simulated clinical problems. Primary attention is devoted to the rationale and design of these problems. Includes both a brief summary of the scoring methods and the statistical studies of exercises that are presently available.

The work undertaken by this group represents a major thrust in the area of situational response testing and should not be ignored.

"Situational Response Testing: An Application of Simulation Principles to Measurement." H. Del Schalock. In *Instructional Simulation: A Research Development and Dissemination Activity,* Paul A. Twelker (Ed.), Monmouth, Oregon: Teaching Research Div., Oregon State System of Higher Education, February 1969.

Presents the rationale for the thesis that simulation has as much to contribute in the area of measurement as it does in the area of instruction. Some critical issues involved in the application of simulation principles to measurement are identified and directions for further research are suggested. A concise, recent review of the state of the art.

F. Bibliographies

The Directory of Educational Games and Simulations. Robert E. Horn and David W. Zuckerman (Eds.), Cambridge, Massachusetts: Information Resources, Inc., in press, expected publication date, Spring 1970.

Contains an extensive listing of all simulations and games that can be used by elementary and secondary schools, colleges, vocational schools, graduate schools, and industrial training groups. It lists only those that are available now or will be in the near future. The exercises are indexed both by target population and subject matter. Each description of an exercise contains 22 items of information including: title, author and affiliation, producer, distributor, kinds of components, supplementary material needed, target population, number of players (maximum and minimum), preparation time for the teacher, playing time (maximum and minimum), cost, and availability. The listing also includes some entries that are designed to help consumers decide on the value of an exercise for their own particular instructional goals. These entries include the roles and objectives of the players, major decisions made in the game, and stated training goal. Present plans call for a new listing of exercises to be published approximately every year.

Simulation and Gaming in Business and Economics in the 1960's: A Bibliography. Edward R. Johnson, Iowa City: College of Business Administration, The University of Iowa, May 1969, 48 pp.

This bibliography is limited to references on gaming and simulation in business and economics and covers the period from 1960 to the present. The bibliography includes references of specific relevance to business and economics as well as references of a more general nature on gaming and simulation.

"Sources in Simulation and Academic Gaming: An Annotated Bibliography." P. J. Tansey and Derick Unwin. *British Journal of Educational Studies, 17,* 2, June 1969, pp. 193-208.

A selected bibliography geared to public school and college instructors which is indexed and contains 87 references.

Instructional Simulation Systems: An Annotated Bibliography. Paul A. Twelker (Ed.), Corvallis, Oregon: Continuing Education Publications, Waldo Hall 100, 1969, 286 pp., ($6.75).

This document lists about 1500 references on simulation and gaming and includes annotations or abstracts for the majority of the listings. The material is drawn from both published and unpublished documents and from civilian, military, and industrial sources. Simulation exercises and games are described in a special format to indicate the subject, learner population, price (if any), materials furnished, and other relevant information. The bibliography lists references through 1968 and purposely omits many of the older articles that are cited elsewhere, unless they appear to be classics in their field. Some references refer to instructional systems design, computer-assisted instruction, programed instruction, game theory, and related topics when they seem to be useful to the designer of instructional simulation systems. An extensive, easy-to-use subject index is provided that allows instant perusal of titles and authors. This document is useful, not only to classroom teachers in that it lists many simulations and games, but also to the serious student of simulation in that it references the broad field of simulation and gaming in the areas of economics, social studies, politics, and government, just to name a few.

Bibliography of Simulations: Social Systems and Education. Roland Werner and Joan Werner, La Jolla, California: Western Behavioral Sciences Institute, 1150 Silverado, 1969, 178 pp., ($4.00).

A 2000-item listing including references on social systems simulations, models, techniques, language, educational games, and computer use. The references are grouped according to topic.

G. Professional Organizations

American Council on Educational Simulation and Gaming (ACESG). Dr. Paul A. Twelker, President, P. O. Box 5131, Industrial Station, 453 N. Snelling Ave., St. Paul, Minnesota 55104.

This newly-formed group arose out of two "simulation leaders conferences" (sponsored by the Macalester Simulation Center) in Chicago and Excelsior Springs during 1969. Those attending were individuals from academic and research organizations that are involved in the construction and utilization of simulations and games for instructional purposes, and it is expected that the ACESG will continue to appeal to this type of professional person. The stated purposes of the organization are (1) to promote the development, evaluation, and use of simulation-based materials, (2) to assess materials with respect to their educational merits and their value within the field, (3) to accredit individuals in the field, (4) to conduct research in the area and (5) to define qualifications for professional practitioners in the field and promote the economic welfare of such practitioners.

American Educational Research Association (AERA), Special Interest Group: Simulation Systems. Dr. John R. Dettre, SIG Secretary-Treasurer, University of Kentucky, Lexington, Kentucky.

The SIG is an informally organized group of AERA and non-AERA members interested in simulation for both research and training purposes. The group is chaired by Dr. Norman H. Sam. To date, the main activity of the group has been to sponsor a general session on simulation at the national AERA meetings. It is expected that, as the group organizational structure evolves, further activities will be undertaken such as sponsoring additional symposia and communication outlets, etc.

The National Gaming Council. Envirometrics, 1100 17th Street N. W., Washington, D. C. 20036.

This informally organized group was formed in 1962 to bring together active practitioners in war gaming. The major activity of the group was to sponsor symposia concentrating on combat gaming. Since 1965, the Council has expanded its scope to cover more diverse gaming areas including social studies, management decision-making games, and civil government games. The stated purpose of the group is to bring together persons interested in gaming to discuss problems, techniques, and applications. Although the focus of the group has been on the use of gaming as a scientific research tool, it is open to other uses including instruction and evaluation

Simulation Councils, Inc. (SCI). 1010 Pearl Street (P. O. Box 2228), La Jolla, California 92037.

SCI is a technical society whose purposes are to advance the design and use of computers and similar devices that employ mathematical or physical analogies and to widen their application to all fields. SCI holds regional council meetings for quick exchange of information, national technical meetings, and various symposia and conferences. The group publishes the journal, *Simulation.* SCI is affliated with the American Federation of Information Processing Societies (AFIPS) and the Institute of Electrical and Electronics Engineers Computer Group. Those interested in things such as in-flight simulation, digital and analog computer simulation techniques, and computers in education will find this organization and its journal of interest.

H. Centers of Activity in Simulation and Gaming

The following groups represent some of the older and nationally recognized centers of activity in simulation and gaming, as well as some newer and less well-known groups. The listing is by no means

exhaustive. Each entry contains the address, the names of key professional staffmembers, the present goals and activities, and other descriptive information available on the center.

Abt Associates, Inc., 55 Wheeler Street, Cambridge, Mass. 02138 (private corporation). Dr. Clark Abt, Alice Gordon, Ray Glazier, and Peter Miller.

Goals: Simulation is seen as a secondary focus to be used when appropriate in achieving the larger goal of solving social problems. Activities: They design and develop simulations and games in all subject areas and at all instructional levels. They conduct training for teachers and other professionals. Descriptive material is available.

Academic Games Associates, 430 East 33rd Street, Baltimore, Md., 21218 (non-profit corporation). Dr. James Coleman, Dr. Michael Inbar, Dr. Sarane Boocock, and Mrs. Kate Day (who should be contacted for further information).

Goals: Research, development, and dissemination of simulation. Activities: They market games, an example of which is *Economics (Trade and Develop)* for grades 6-12, and develop social studies games for the high-school level and up. Research consists of testing individual games, and training is carried out on an irregular basis with some workshops. A description of *Trade and Develop* will be sent upon request. An Academic Games Associates catalog is available from Western Publishing Co., School and Library Development, 850 Third Ave., New York, N. Y. 10022.

Academic Games Project, Center for Study of Social Organization of Schools, 3505 North Charles Street, Baltimore, Md. 21218 (university-related department). Dr. James Coleman, Dr. Michael Inbar, Dr. Clarice Stoll, and Mr. Samuel Livingston.

Goals: Basic research on games as socialization devices and evaluative research on games and simulation for teaching. Activities: Cross-cultural research is conducted on the role of games in socialization. Games are evaluated for individual learning and skill attainment, and the effects of games on classroom structure are studied. Research reports are available.

Applied Simulations International, Suite 900, 1100 17th Street N. W., Washington, D. C. 20036 (private corporation). George Perla, Pat O'Day, Peter House, Tom Mierzwa, and William Cannon.

Goals: To make available an urban simulation laboratory for educational, training, and research purposes. Activities: They conduct seminars and training institutes for schools, professional groups, city officials, and others interested in urban simulations. They plan to market operational simulation models of the urban environment. Descriptive material is available.

Behavioral Sciences Laboratory, College of Social and Behavioral Sciences, Ohio State University, 404-B West 17th Avenue, Columbus, Ohio 43210 (university-related, interdisciplinary group). Dr. Phillip M. Burgess.

Goals: The development and appraisal of simulation and gaming techniques for learning, with special emphasis on political-social issues and processes. Activities: Man-computer and computer techniques are used in on-going research efforts emphasizing decision-making processes, coalitions, voluntary associations, and other organizational processes. Simulation is also being explored as a technique for enhancing social forecasting capabilities. Simulations and games are developed to support research and training. Advanced students in the social sciences are trained to use simulation in teaching and research. Documents are available, including a series of occasional monographs, "BSL Research Reports."

Behavioral Simulation and Gaming Group, Political Science Department, Peoples Avenue Complex, Bldg. D, Rensselaer Polytechnic Institute, Troy, N. Y. 12181 (university-related department). Dr. Marshall H. Withed (who should be contacted for further information), and Mr. Robert Lund, who is computer projects supervisor.

Goals: The design of and research on simulations is primary. Activities: The design of political science, urban design, and business simulation games for the college level. A simulation division is presently

being established to design and sell simulation models. The establishment of simulation-based training programs for teachers, as well as other professional programs, are anticipated. A newsletter and descriptive materials are available.

College of Education, University of Oklahoma, Norman, Okla. 73069 (an informally organized group). Dr. Thomas Wiggins, Associate Professor and Dr. Robert E. Ohm, Dean.

Goals: The design of simulations and games as a secondary focus. Activities: Developing administrative simulations for elementary, secondary, and higher education and training teachers. No descriptive material is available.

Department of Sociology and Anthropology, University of Southern California, University Park, Los Angeles, Calif. 90007 (university-related department). Dr. Sarane Boocock and Dr. Vern Bengtson.

Goals: Research on simulation and games is a secondary goal. Activities: Research is conducted on problems of validating simulation models and on the use of simulations to study the problems of age–heterogeneous relations–(e.g., between parents and adolescent children, between superiors and subordinates in offices, etc.).

The Didactic Games Co. and **Didactic Systems, Inc.**, P. O. Box 500, Westbury, N. Y. 11590 (private company). Erwin Rausch and George Walker.

Goals: The creation and development of simulations, games and other participative training materials for all instructional and training levels. The popularization of simple, easy-to-use simulation and game techniques. Activities: Individual and group simulations and didactic games are sold for the high school through college instructional levels and covering blue collar skills through sales and marketing skills to sophisticated management topics. Games and simulations are developed on specific educational and training objectives for schools, institutions, and industry. Games are explored as means for solving social problems. Sales, marketing, supervisory, and management personnel at all levels are trained using broad applications of simulation and improvised game techniques. Descriptive material (including a listing of available games) and a newsletter are available.

Educational Games Company, P. O. Box 363, Peekskill, N. Y. 10566 (private company). Joseph Young, Managing Director.

Goals: To develop, design, and sell educational games. Activities: Games for the upper-elementary to high-school level are sold. The staff is formulating an expansion of the game of *Selection* to include a classroom kit and class participation in the primary grades. They are designing educational games in the area of driver education for high schools. A descriptive brochure and informational materials are available.

Educational Simulation Laboratory, College of Education, Ohio State University, Columbus, Ohio. (university-related facility). Donald Cruickshank and John B. Hough.

Goals: The laboratory is in a formative stage and no goals are yet defined. Activities: Plans are being formulated in development, research, and training. Descriptive material is not yet available. Dr. Cruickshank's previous simulation exercises have been published by SRA.

Envirometrics, Inc., Suite 900, 1100 17th Street N. W., Washington, D. C. 20046 (private, non-profit corporation). Dr. Peter House (President), Dr. Philip Patterson, Janice Cooper, Bill Arnold, Robert Pickett, Ed Northwood, Jerre Manarolla, and Eric Zallman.

Goals: The examination of new tools for the urban problem-solver and the development of urban gaming/simulation as a way to direct technology towards environmental solutions. Activities: Operational simulation models of the urban and regional environment are designed and developed. Research is conducted on urban and regional development using operational simulation. Descriptive material is available.

Games Group, Mental Health Research Institute, University of Michigan, Ann Arbor, Mich. 48104 (informal, interdisciplinary group of university faculty and students). Prof. Layman E. Allen, Mental Health

Research Center (who should be contacted for further information), and Prof. Frederick Goodman, School of Education.

Goals: Development, testing, and training in the use of instructional games (both simulation and non-simulation). Activities: Games are designed in math, logic, social studies, music, linguistics, history, grammar, and counseling. Research is conducted on programed games and on the learning of problem-solving skills. Training for teachers and other professionals is carried out. Descriptive material is available.

Information Resources, Inc., 96 Mount Auburn Street, Cambridge, Mass. 02138 (private corporation). Dr. Robert Horn.

Goals: Research, development, and training in the area of simulation is one major focus (CAI is the other). Activities: Development and marketing of social studies and business management simulations at the high school and adult levels. Research involves theoretical studies on simulation. For the near future, training activities are being planned for teachers, training directors, etc. Descriptions and specification sheets for the exercises are available.

Instructional Simulations, Inc. (ISI), 2147 University Avenue, St. Paul, Minn. 55104 (private corporation and limited partnership). Ronald G. Klietsch (Program Director), Kent T. Layden (Technical Service Mgr.), James R. Hanson (Learning Systems Director), and L. Orning (Field Service Mgr.).

Goals: To develop and distribute simulations and games, to conduct research, and to provide consulting services. Activities: The sale of simulations and games (e.g., in urban land use, community situations, political science, and other socio-economic areas). The design and development of simulations and games at all instructional levels and in all subject areas. ISI materials are evaluated and other formal reserach programs are undertaken on an individual basis by ISI staffmembers. In the area of training, workshops, institutes, in-service training programs, field service consulting, conventions, etc. are conducted. Descriptive material (including a brochure of ISI games), newsletters (available quarterly), position papers, and a directory of learning games are available.

Interact, P. O. Box 262, Lakeside, Calif. 92040 (partnership of two teachers for marketing and consulting purposes). Paul DeKock and David Yount.

Goals: The creation and sale of simulations and the changing of teachers' attitudes toward themselves. Activities: They develop and market social studies games for the fifth-grade through adult instructional levels. They do research on the effects of games. They have conducted NDEA workshops in which civics teachers created models for their own simulations. A catalog is available.

Kansas Educational Simulation Center, Division of Social Sciences, Kansas State Teachers College, Emporia, Kansas 66801 (university-related department). Prof. Dale M. Garvey (Political Science), and Prof. Robert Thompson (Sociology).

Goals: The development of simulations and games and in-service and pre-service instruction for teachers in the uses of simulation and gaming techniques. Activities: Elementary, secondary, and college-level exercises in the area of politics are developed with attention at present being focused on Sociology. Comparative studies are conducted on the effect of games in classroom learning. In-service and pre-service training for teachers is carried out (both in summer sessions and during regular academic semesters). No descriptive materials are available at present.

Learning Games Associates, (WFF'N PROOF), 2253 Medford Road, Ann Arbor, Mich. 48104 (unincorporated firm). Ruth C. Patmore.

Goals: The design, testing, production, and dissemination of instructional games (simulation and non-simulation). Activities: Math, logic, geometry, strategic problem-solving, and social studies games for the primary through college instructional levels are developed and sold. Research is conducted on programed games and on the learning of problem-solving skills. Training for teachers and other professionals is carried out. Descriptive material and a newsletter are available.

National Academic Games Project, Nova University, S. W. College Avenue, Fort Lauderdale, Fla. 33314 or 24064 Avenida Crescenta, Valencia, Calif. 91355 (university-related department). Robert W. Allen and R. Lawrence Liss.

Goals: To develop autotelic (self-motivating and self-directing) instructional materials, especially academic games, for use in the schools and in the home (for all age levels). To train teachers in the use of autotelic and other materials. Activities: Academic games in all subject areas from pre-school through college are developed (e.g., *Euro-Card, Propaganda, Equations, WFF'N PROOF,* and *Redi-Read*). Teacher-training workshops and in-school demonstrations are conducted. Descriptive materials, including a newsletter and films, are available.

Political Institutions Simulation Laboratory (POLIS), University of California, Political Science Department, Santa Barbara, Calif. 93106 (university-related project). Robert C. Noel, R. J. Snow, Dean E. Mann, Roger Davidson, and Richard Harris.

Goals: The examination of simulation and gaming for both teaching and research purposes. General experimental studies related to political behavior. Activities: Developing simulations of national policies (American), urban policies, foreign policy and international relations, general social processes, politics in the developing areas, etc. Research is being conducted on the methodology of laboratory simulation and experimentation. Training activities are a part of the regular undergraduate curriculum. Descriptive material is available.

Project SIMILE–Western Behavioral Sciences Institute, 1150 Silverado Road, La Jolla, Calif. 92037 (non-profit corporation). R. Garry Shirts.

Goals: Research into the effects of and the new applications of simulation is a primary goal for the project and a secondary one for WBSI. Activities: Research is conducted to study the effect of simulation on depolarizing groups and making them more effective. Games are developed only as they apply to research. A newsletter is available.

Real World Learning, Inc., 134 Sunnydale Avenue, San Carlos, Calif. 94070 (private corporation). Dennis C. Dobbs, Carol G. Goodell, and Robert F. Hill.

Goals: To design games and to train teachers to use simulations. Activities: Social science and language games are designed for the elementary and secondary instructional levels. Training is conducted at workshops across the country and in university courses. Descriptive materials are available.

SIMILE II, 1150 Silverado Road (P. O. Box 1023), La Jolla, Calif. 92037 (private corporation). Dr. Wayman J. Crow and R. Garry Shirts.

Goals: The development and dissemination of educational and training simulations. Activities: They develop and market social studies games for the third-grade through college levels. They conduct a yearly workshop plus training programs for specific educational and church groups. Descriptive material and a newsletter are available.

Simulated International Processes Project of the International Relations Program, 1834 Sheridan Road, Northwestern University, Evanston, Illinois 60201 (university-related research project). Dr. Harold Guetzkow and Mr. Michael R. Leavitt.

Goals: Their present, primary goal is the development of computer simulation modules for international relations. A previous goal was the acceleration of achievements in research using simulation techniques for the analysis of political-military problems in international relations. Activities: Computer simulations in international relations are developed. Research is being done to appraise the validities of aspects of the *Inter-Nation Simulation (INS)* which will lead to a second generation formulation, the *International Processes Simulation (IPS).* Descriptive material is available.

Simulation Systems Program, Teaching Research Division, Oregon State System of Higher Education, Monmouth, Oregon 97361 (interinstitutional, interdisciplinary agency associated with a state higher education system). Dr. Paul A. Twelker, Dr. Jerry L. Fletcher, Mr. Russel Durham.

Goals: The study of simulation and games in all forms and the application of these techniques to instructional problems. Activities: Social studies games at the secondary level and classroom management and discovery teaching simulations for pre-service teachers are developed. Research is carried out on the major variables in simulation gaming. Training is conducted for higher education personnel and for teachers of U.S. History and Modern Problems at the secondary level. Research reports, papers, and newsletters are available.

Sociology Department, University of Michigan, Ann Arbor, Mich. 48104 (university-related department). William A. Gamson (Department of Sociology), Joseph Ben Dak (Center for Research on Conflict Resolution), and Paul Ray (Center for Regional Planning).

Goals: Simulation is a secondary focus. The primary goals are research and teaching. Activities: Simulations are designed for use in undergraduate and graduate teaching and for research purposes. Evaluative research is conducted on an Arab-Israeli conflict simulation. A course in the development of game simulations of social processes is taught for sociology majors, education majors, and others. No descriptive materials are available.

I. Journals

Simulation. Simulation Councils, Inc., P. O. Box 8248, San Diego, Calif. John Mcleod, Editor, Monthly, $28 annually.

Reports on the use of computers and similar devices employing mathematical or physical analogies. Includes a calendar of events of computer-related groups, a section on computers in education, articles, simulation surveys, and literature reviews.

Simulation and Games: An International Journal of Theory, Design, and Research. Sage Publications, 275 South Beverly Drive, Beverly Hills, Calif. 90212. Michael Inbar (Hebrew University and Johns Hopkins University), Editor-in-Chief. Published quarterly (commencing in 1970), $15 annually and professional discounts are available.

This journal provides a forum for theoretical and empirical papers related to simulations (man, man-machine, and machine) of social processes. It will publish theoretical papers concerned with the use of simulation for research and instruction, empirical studies, and technical papers about new gaming techniques. Book reviews, listing of newly available simulations, and short simulation reviews will be included.

J. Newsletters

Behavioral Simulation Newsletter (formerly RPI Simulation Newsletter). Behavioral Simulation and Gaming Group, Political Science Department, Peoples Avenue Complex, Bldg. D, Rennselaer Polytechnic Institute, Troy, N. Y. 12181. Marshall H. Withed, Editor. Issued on an irregular basis.

Reports activities of the staff of the Behavioral Simulation and Gaming Group, as well as other items of interest, especially for those in political science and related fields.

ISI Learning Letter. Instructional Simulations, Inc., 2147 University Avenue, St. Paul, Minn. 55104. Ronald G. Klietsch, Editor. Five issues per year, $1 per year.

Includes items of special interest to classroom teachers and simulation games users.

Instructional Simulation Newsletter. Simulation Systems Program, Teaching Research Division, Oregon State System of Higher Education, Monmouth, Ore. 97361. Paul A. Twelker, Editor. Published three times a year on an irregular basis, free.

Reports activities of the Simulation Systems Program (including reports and products available) and other articles of interest to instructors, researchers, and developers.

Occasional Newsletter About Uses of Simulations and Games for Education and Training. Project SIMILE, Western Behavioral Sciences Institute, 1150 Silverado Road, La Jolla, Calif. 92037. Compiled by the project staff. Published three times a year on an irregular basis, $5 per year.

Reports reviews of commerical games as well as activities by individuals in the field. A comprehensive, informative, and valuable document for the classroom teacher as well as the sophisticated gamer.

Political and Social Simulation Newsletter. Haverford College, Haverford, Penn. 19041. David Hsia, Editor. Monthly, about $6.

Reports items of interest to political and social scientists.

The WFF'N PROOF Newsletter. WFF'N PROOF, P. O. Box 71, New Haven, Conn. 06501. Ruth C. Patmore, Editor. Published quarterly, $1 per year.

Reports activities of the National Academic Games Olympics, championship games at the local school level, and new games available from the publisher.

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